EXERCISES.

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A SOLID sphere and a solid cylinder of equal radii roll from rest down the same inclined plane ; compare the times of their descent.

[*Artemas Martin.*]

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PROVE that, in Weierstrass's notation,

$$\sigma u\, \sigma_3 v\, \sigma_2 w + \sigma_3 u\, \sigma v\, \sigma_1 w + \sigma_2 u\, \sigma_1 v\, \sigma w = 0\,,$$

where $u + v + w = 0$.

[*Frank Morley.*]

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LAGRANGE'S interpolation formula is

$$fx = \sum_1^n A_n f a_r + (-1)^n (x - a_1) \ldots (x - a_n) \frac{f^n(u)}{n!}\,,$$

wherein u is some value of x which lies between the greatest and least of the values $x, a_1, \ldots, a_n$, and $f^n(u)$ means that fx is to be differentiated n times and in the result u put in the place of x ; and

$$A_r = \Pi \frac{(x - a_i)}{(a_r - a_i)}\,. \qquad (i = 1, \ldots, r-1, r+1, \ldots, n)$$

If $a_r = a^r x$, we have

$$fx + \sum_1^n A_r f a^r x = (a - 1) \ldots (a^n - 1) \frac{x^n}{n!} f^n(u)\,,$$

$$A_r = (-1)^r \frac{a^r (1 - a^{-(n-r+1)}) \ldots (1 - a^{-n})}{(a - 1) \ldots (a^r - 1)}\,.$$

Interpret this result when a lies between $+1$ and -1, and also when $a^2 > 1$ and $n = \infty$.

[*W. H. Echols.*]

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REQUIRED the locus of the point in the normal to a conic, which is equally distant from the focus and the foot of the normal.

[*Geo. R. Dean.*]